

MASTER OF SCIENCE IN AERONAUTICAL ENGINEERING

ANALYSIS OF TRACKING AND IDENTIFICATION CHARACTERISTICS OF DIVERSE SYSTEMS AND DATA SOURCES FOR SENSOR FUSION

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In the Command and Control mission, new technologies such as 'sensor fusion' are designed to help reduce operator workload and increase situational awareness. This thesis explored the tracking characteristics of diverse sensors and sources of data and their contributions to a fused tactical picture. The fundamental building blocks of any sensor fusion algorithm are the tracking algorithms associated with each of the sensors on the sensor platform. In support of this study, the MATLAB program '*fusim*' was written to provide acquisition managers a tool for evaluating tracking and sensor fusion algorithms.

The *fusim* program gives the user flexibility in selecting: sensor platforms, up to four sensors associated with that platform, the target types, the problem orientation, and the tracking algorithms to be used with the sensors. The *fusim* program was used to compare tracking algorithms in a multiple sensor/multiple target environment. Specifically, the Probabilistic Data Association Filter, the Interacting Multiple Models Filter, the Kalman Filter and the Constant Gain Kalman Filter were evaluated against multiple maneuvering, non-maneuvering, and fixed targets. It is recommended that this study be continued to evaluate advanced tracking and data association techniques, to expand the program to allow attribute tracking and identification, and to study the Human-Machine Interface aspects of sensor fusion.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Sensors, Command Control and Communications, Computing and Software

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